AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims

Please cancel claims 70-88.

1. (original) A method of measuring an amount of an organic substance contained within a biological sample, said organic substance having an infrared absorption spectrum which includes a set (n) of wavelength regions, wherein each of said wavelength regions substantially correspond to an absorption band of said absorption spectrum, comprising:

(a) detecting the intensity of a number of selected wavelength bands of infrared electromagnetic radiation influenced by said organic substance contained within said biological sample with a detection system, wherein (i) each of said selected wavelength bands substantially corresponds to one of said wavelength regions and (ii) said number of said selected wavelength bands is equal to n-1 or less;

(b) generating an electrical signal in response to detecting the intensity of said number of said selected wavelength bands;

(c) receiving said electrical signal with a signal processor configured to process said electrical signal with a quantification algorithm; and processing said electrical signal with said quantification

(d) algorithm so as to provide a measurement of said amount of said organic substance contained with said biological sample.

2. (original) The method of claim 1, including detecting the intensity of said selected wavelength bands of infrared electromagnetic radiation influenced by glucose with said detection system.

3. (original) The method of claim 1, including collecting said biological sample from a mammal.

4. (original) The method of claim 1, wherein:

said quantification algorithm of (c) includes dividing a first wavelength band integrated absorbance value by a reference wavelength band integrated absorbance value.

5. (original) The method of claim 4, wherein:

said quantification algorithm of (c) further includes dividing a second wavelength band integrated absorbance value by said reference wavelength band integrated absorbance value.

6. (original) The method of claim 1, wherein:

(a) includes detecting the intensity of (i) about 1090 cm-1 to about 1075 cm-1 wavelength band of infrared electromagnetic radiation and (ii) about a 1095 cm-1 to about 1090 cm^{-1} wavelength band of infrared electromagnetic radiation.

7. (original) The method of claim 1, wherein:

(a) includes detecting the intensity of (i) about a 1090 cm^{-1} to about 1075 cm^{-1} wavelength band of infrared electromagnetic radiation, (ii) about a 1175 cm^{-1} to about 1137 cm^{-1} wavelength band of infrared electromagnetic radiation, and (iii) about a 1180 cm^{-1} to about 1170 cm^{-1} wavelength band of infrared electromagnetic radiation.

8. (original) The method of claim 1, wherein:

said number of selected wavelength bands of (a) are within a range The method of claim 1 , wherein: defined by about 1400 cm^{-1} to about 950 cm^{-1}.

9. (original) A method of measuring an amount of glucose in a biological fluid, wherein said glucose has an infrared absorption spectrum which includes a set (n) of infrared wavelength regions, wherein each of said infrared wavelength regions substantially correspond to an infrared absorption band of said infrared absorption spectrum, comprising:

(a) detecting the transmittance of a number of selected wavelength bands of infrared electromagnetic radiation absorbed by said glucose contained within said biological fluid with a detection system, wherein (i) each of said selected wavelength bands substantially corresponds to one of said wavelength regions and (ii) said number of said selected wavelength bands is equal to n-1 or less;

(b) generating an electrical signal in response to detecting the transmittance of said infrared electromagnetic radiation;

(c) receiving said electrical signal with a signal processor configured to process said electrical signal with a quantification algorithm; and

(d) processing said electrical signal with said quantification algorithm so as to provide a measurement of said amount of said glucose contained within said biological fluid.

10. (original) The method of claim 9, further comprising:

(e) collecting said biological fluid with a filtrate collector in fluid communication with a body fluid of a mammal.

11. (original) The method of claim 10, wherein:

said mammal is a human.

12. (original) The method of claim 9, wherein:

said quantification algorithm of (c) includes dividing a first wavelength band integrated absorbance value by a reference wavelength band integrated absorbance value.

13. (original) The method of claim 9, wherein:

said quantification algorithm of (c) furthe- includes dividing a second wavelength band integrated absorbance value by said reference wavelength band integrated absorbance value.

14. (original) The method of claim 12, wherein:

(a) includes detecting the transmittance of (i) about a 1090 cm^{-1} to about 1075 cm^{-1} wavelength band of infrared electromagnetic radiation and (ii) about a 1095 cm^{-1} to about 1090 cm^{-1} wavelength band of infrared electromagnetic radiation.

15. (original) The method of claim 13, wherein:

(a) includes detecting the transmittance of (i) about a 1090 cm^{-1} to about 1075 cm^{-1} wavelength band of infrared electromagnetic radiation, (ii) about a 1175 cm^{-1} to about 1137 cm^{-1} wavelength band of infrared electromagnetic radiation, and (iii) about a 1180 cm^{-1} to about 1170 cm^{-1} wavelength band of infrared electromagnetic radiation.

16. (original) The method of claim 9, wherein:

said number of selected infrared wavelength bands of (a) are within a range defined by about 1400 cm^{-1} to about 950 cm^{-1}.

17. (original) A method of measuring a concentration of an organic substance contained within a biological fluid, said organic substance having an infrared absorption spectrum which includes a set (n) of infrared wavelength regions, wherein each of said infrared wavelength regions substantially correspond to an infrared absorption band of said infrared absorption spectrum, comprising:

(a) detecting the transmittance of a number of selected wavelength bands of infrared electromagnetic radiation absorbed by said organic substance contained within said biological fluid with a detection system, wherein (i) each of said selected wavelength bands

substantially corresponds to one of said wavelength regions and (ii) said number of said selected wavelength bands is equal to n-1 or less;

(b) generating an electrical signal in response to detecting the transmittance of said selected infrared electromagnetic radiation wavelength bands;

(c) receiving said electrical signal with a signal processor configured to process said electrical signal with a mathematical model; and

(d) processing said electrical signal with said mathematical model so as to provide a measurement of the concentration of said organic substance contained within said biological fluid.

18. (original) The method of claim 17, wherein:

(a) includes detecting the transmittance of said selected electromagnetic radiation wavelength bands absorbed by glucose contained within said biological fluid with said detection system.

19. (original) The method of claim 18, wherein:

said mathematical model includes the mathematical equation

$C_g = P_o + P_1 IAR_{\lambda,1} + P_2 IAR^2{}_{\lambda,1}$

wherein (i) C_g is the mean-centered concentration of glucose in said biological fluid, (ii) P_i is a calibration constant, and (iii) $IAR_{\lambda,1}$ is a mean-centered integrated absorbance ratio of two of said selected wavelength bands.

20. (original) The method of claim 18, wherein:

said mathematical model includes the mathematical equation

$C_g = P_o + P_1 IA_{\lambda,1} + P_2 IA^2{}_{\lambda,1} + P_3 IA^2{}_{\lambda,1} + P_4 IA^2{}_{\lambda,2} + P_5 IA_{\lambda,1}$

wherein (i) C_g is the mean centered concentration of glucose in said biological fluid, (ii) P_i are calibration constants, and (iii) $IA_{\lambda,1}$ and $IA_{\lambda,1}$ are the mean centered integrated absorbance for the selected wavelength band and the selected reference wavelength band.

21. (original) The method of claim 18, wherein:

said mathematical model includes the mathematical equation

$C_g = P_0 + P_1 IAR_{\lambda,1} + P_2 IAR_{\lambda,2} + P_3 IAR^2{}_{\lambda,1} + P_4 IAR^2{}_{\lambda,2} + P_5 IAR_{\lambda,1}\ IAR_{\lambda,2}$

wherein (i) C_g is the mean-centered concentration of glucose in said biological fluid, (ii) P_i are calibration constants, and (iii) $IAR_{\lambda,j}$ is a mean-centered integrated absorbance ratio of two of said selected wavelength bands.

22. (original) The method of claim 18, wherein:

said mathematical model includes the mathematical equation

$Cg = P_0 + P_1IA_{\lambda,1} + P_2IA_{\lambda,2} + P_3IA_{\lambda,3} + P_4IA^2_{\lambda,1} + P_5IA^2_{\lambda,2} + P_6IA^2_{\lambda,3} + P_7IA^2_{\lambda,2} + P_g\, IA_{\lambda,3} + P_9IA_{\lambda,2}\, IA_{\lambda,3}$

wherein (i) C_g is the mean centered concentration of glucose in said biological fluid, (ii) P_i are calibration constants, and (iii) $IA_{\lambda,j}$ is the mean centered integrated absorbance for band j.

23. (original) A method of measuring an amount of an organic substance contained within a biological sample, said organic substance having an infrared absorption spectrum which includes a set (n) of wavelength regions, wherein each of said wavelength regions substantially correspond to an absorption band of said absorption spectrum, comprising:

(a) illuminating said biological sample with infrared electromagnetic radiation, wherein said infrared electromagnetic radiation includes (i) one or more wavelength bands of said infrared electromagnetic radiation which are absorbed by said organic substance contained within said biological sample (ii) one or more reference wavelength bands which are not substantially absorbed by said organic substance contained within said biological sample;

(b) selecting a number said wavelength bands of said infrared electromagnetic radiation, wherein (i) each of said selected wavelength bands substantially corresponds to one of said wavelength regions and (ii) said number of said selected wavelength bands is a subset of (n);

(c) selecting a number of reference wavelength bands;

(d) detecting the intensity of only (i) said subset of said selected wavelength bands absorbed by said organic substance contained within said biological sample with a detection system and (ii) said number of reference wavelength bands;

(e) generating one or more electrical signals in response to detecting the intensity of only (i) said subset of said selected wavelength bands (ii) said number of reference wavelength bands;

(f) receiving said one or more electrical signals with a signal processor configured to process said electrical signals with a quantification algorithm; and

(g) processing said one or more electrical signals with said quantification algorithm so as to provide a measurement of said amount of said organic substance contained within said biological sample.

24. (original) A method of measuring an amount of an organic substance contained within a biological sample, said organic substance having an infrared absorption spectrum which includes a set (n) of wavelength regions, wherein each of said wavelength regions substantially correspond to an absorption band of said absorption spectrum, comprising:

(a) illuminating said biological sample with infrared electromagnetic radiation;

(b) detecting the intensity of said infrared electromagnetic radiation that is absorbed by said organic substance contained within said biological sample, wherein (i) said intensity detection is restricted to a number of selected wavelength bands of infrared electromagnetic radiation, (ii) each of said selected wavelength bands substantially corresponds to one of said wavelength regions and (iii) said number of said selected wavelength bands is a subset of (n);

(c) generating an electrical signal in response to detecting the intensity of said subset of said selected wavelength bands;

(d) receiving said electrical signal with a signal processor configured to process said electrical signal with a quantification algorithm; and

(e) processing said electrical signal with said quantification algorithm so as to provide a measurement of said amount of said organic substance contained within said biological sample.

25. (original) The method of claim 22, further comprising:

(f) detecting the intensity of one or more reference wavelengths bands of said infrared electromagnetic radiation which are not absorbed by said organic substance contained within said biological sample,

wherein (c) includes generating said electrical signal in response to detecting the intensity of said one or more reference wavelength bands.

26. (original) A method of measuring an amount of an organic substance contained within a sample, said organic substance having an infrared absorption spectrum which includes a set (n) of wavelength regions, wherein each of said wavelength regions substantially correspond to an absorption band of said absorption spectrum, comprising:

(a) illuminating said sample with infrared electromagnetic radiation, wherein said infrared electromagnetic radiation includes (i) one or more wavelength bands of said infrared electromagnetic radiation which are absorbed by said organic substance contained

within said sample (ii) one or more reference wavelength bands which are substantially not absorbed by said organic substance contained within said sample;

(b) selecting a number said wavelength bands of said infrared electromagnetic radiation, wherein (i) each of said selected wavelength bands substantially corresponds to one of said wavelength regions and (ii) said number of said selected wavelength bands is a subset of (n);

(c) selecting a number of reference wavelength bands; and

(d) detecting with a detection system the intensity of only (i) said subset of said selected wavelength bands absorbed by said organic substance contained within said sample and (ii) said number of reference wavelength bands.

27. (original) A method of measuring an amount of an organic substance contained within a biological sample, said organic substance having an infrared absorption spectrum which includes a set (n) of wavelength regions, wherein each of said wavelength regions substantially correspond to an absorption band of said absorption spectrum, comprising:

(a) illuminating said biological sample with infrared electromagnetic radiation, wherein said infrared electromagnetic radiation includes (i) one or more wavelength bands of said infrared electromagnetic radiation which are absorbed by said organic substance contained within said biological sample and (ii) one or more reference wavelength bands which are substantially not absorbed by said organic substance contained within said biological sample;

(b) selecting a number said wavelength bands of said infrared electromagnetic radiation, wherein (i) each of said selected wavelength bands substantially corresponds to one of said wavelength regions and (ii) said number of said selected wavelength bands is a subset of (n);

(c) selecting a number of reference wavelength bands;

(d) detecting with a detection system the intensity of said infrared electromagnetic radiation; and

(e) processing with a mathematical model spectral data only from (i) said subset of said selected wavelength bands absorbed by said organic substance contained within said biological sample and (ii) said number of reference wavelength bands.

28. (original) A method for determining a patient glucose level, comprising:

(1) obtaining a sample of a cell-free, blood-based body fluid in a sample container having a pre-defined measurement path;

(2) passing an incident infrared signal through said sample over said measurement path, wherein (a) said incident signal comprises wavelengths in a measurement range of from 7 to 11 microns, (b) said incident signal comprises at least two glucose absorbance bands in said measurement range and at least one reference band, and (c) said incident signal is modulated;

(3) detecting a post-absorbance signal comprising all three of said bands after said incident signal is absorbed by said sample using a detector configured to preferentially detect said modulated signal relative to unmodulated signals; and

(4) calculating glucose concentration in said sample from said post-absorbance signal.

29. (original) The method of claim 28, wherein said body fluid is plasma, serum, or interstitial fluid.

30. (original) The method of claim 29, wherein said body fluid is interstitial fluid.

31. (original) The method of claim 28, wherein said sample is transported from a source location at or inside a patient body to a measurement location outside a patient body and said measurement container is present at said measurement location.

32. (original) The method of claim 30, wherein said source location is at an implanted needle site, a subcutaneous membrane surface, or a skin surface subjected to ionoporation, microporation, or reverse ionophoresis.

33. (original) The method of claim 30, wherein said interstitial fluid is filtered to remove proteins prior to passing said infrared signal through said sample.

34. (original) The method of claim 33, wherein at least 80% of said proteins are removed prior to passing said infrared signal through said sample.

35. (original) The method of claim 34, wherein at least 96% of said proteins are removed prior to passing said infrared signal through said sample.

36. (original) The method of claim 35, wherein at least 98% of said proteins are removed prior to passing said infrared signal through said sample.

37. (original) The method of claim 29, wherein said body fluid has been passed through a filter having a molecular weigh cut off in a range from 10 kD to 100 kD prior to passing said infrared signal through said sample.

38. (original) The method of claim 29, wherein said body fluid has been passed through a filter having a molecular weigh cut off in a range from 10 kD to 40 kD prior to passing said infrared signal through said sample.

39. (original) The method of claim 29, wherein said body fluid has been passed through a filter having a molecular weight cut off in a range from 10 kD to 25 kD prior to passing said infrared signal through said sample.

40. (original) The method of claim 28, wherein said measurement path has a length in a range from 5 to 60 microns.

41. (original) The method of claim 40, wherein said measurement path has a length in a range from 15 to 35 microns.

42. (original) The method of claim 28, wherein said two glucose absorbance bands are a first and a second glucose absorbance band selected so that said first glucose absorbance band has a first relative absorbance for an interfering substance potentially present in said body fluid and said second glucose absorbance band has a second relative absorbance for said interfering substance, wherein said first and second relative absorbances are different from each other.

43. (original) The method of claim 42, wherein said incident signal further comprises a third glucose absorbance band selected so that said third glucose absorbance band has (a) a third relative absorbance for said interfering substance potentially present in said body or (b) a fourth relative absorbance for a second interfering substance potentially present in said body.

44. (original) The method of claim 42, wherein said interfering substance is lactic acid, a lactate salt, ascorbic acid, an ascorbate salt, mannitol, acetaminophen, ethanol, or a phosphate salt.

45. (original) The method of claim 43, wherein said interfering substance is lactic acid or a lactate salt and said second interfering substance is ascorbic acid, an ascorbate salt, mannitol, acetaminophen, ethanol, or a phosphate salt.

46. (original) The method of claim 33, wherein said two glucose bands are selected to be within or to overlap ranges selected from 1090 cm^{-1} to 1075 cm^{-1} [9.174 to 9.302

microns], 1175 cm^{-1} to 1137 cm^{-1} [8.511 to 8.795 microns], and 1180 cm^{-1} to 1170 cm^{-1} [8.475 to 8.547 microns]

47. (original) The method of claim 33, wherein said two glucose bands are selected to be within or to overlap ranges selected from a band having a center wavelength of 7.930 microns and a bandwidth of 170 nm [7.845 to 8.015 microns], a band having a center wavelength of 9.320 microns and a bandwidth of 400 nm [9.120 to 9.520 microns], and a band having a center wavelength of 8.330 microns and a bandwidth of 140 nm [8.260 to 8.400 microns].

48. (original) The method of claim 30, wherein said two glucose bands are selected to be within or to overlap ranges selected from a band having a center wavelength of 9.62 microns and a bandwidth of 200 nm, a band having a center wavelength of 9.22 microns and a bandwidth of 200 nm, a band having a center wavelength of 8.62 microns and a bandwidth of 200 nm, a band having a center wavelength of 9.02 microns and a bandwidth of 200 nm, and a band having a center wavelength of 7.33 microns and a bandwidth of 200 nm.

49. (original) The method of claim 28, wherein said fluid is interstitial fluid, wherein said interstitial fluid is transported from a source location at or inside a patient body to a measurement location outside a patient body and said measurement container is present at said measurement location, wherein said interstitial fluid is passed through a filter having a molecular weight cut off in a range from 10 kD to 40 kD prior to passing said infrared signal through said sample, wherein said measurement path has a length in a range from 20 to 30 microns, and wherein said post-absorbance signal contains glucose absorbance date from a region from 8.3 to 10.3 microns.

50. (original) The method of claim 28, wherein said modulated signal is modulated by varying at least a part of the current, the voltage, or the frequency provided to the device that generates the incident infrared signal.

51. (original) The method of claim 28 wherein said incident signal is modulated by the periodic insertion of an infrared blocking material.

52. (original) The method of claim 50 further comprising performing a second modulation technique on the infrared signal.

53. (original) The method of claim 51 further comprising performing a second modulation technique on the infrared signal.

54. (original) The method of claim 50 wherein the modulated signal is the emitter output modulated at from 01. Hz to 10 Hz and the second modulation technique includes placing and removing a radiation absorbing material in the pathway of the infrared signal.

55. (original) The method of claim 54 wherein the modulated signal is the emitter output modulated at 3 Hz.

56. (original) The method of claim 28, wherein the sample cell window material is selected from the group consisting of: barium fluoride, silicon and zinc selenide.

57. (original) A method for determining a patient glucose level, comprising:

(1) obtaining a sample of a biological fluid in a sample cell having a path of defined path length for infrared absorption;

(2) transmitting mid infrared radiation through said sample along said path, wherein (a) said incident signal comprises at least two glucose absorbance bands and at least one reference band, and (b) said transmitted radiation is modulated;

(3) detecting radiation from said two glucose absorbance bands and said reference band after said radiation is absorbed by said sample using a detector configured to detect said modulated radiation; and

(4) generating an electrical signal in response to detecting said modulated radiation;

(5) receiving said electrical signal with a signal processor configured to process the electrical signal with a quantification algorithm; and

(6) processing said electrical signal with said quantification algorithm, thereby providing a measurement of glucose contained within the biological sample.

58. (original) The method of claim 57, wherein said mid infrared radiation comprises wavelengths in a range of from 1200 cm^{-1} to 900 cm^{-1}.

59. (original) The method of claim 57, wherein said biological fluid is plasma, serum, or capillary filtrate fluid.

60. (original) The method of claim 59, wherein said biological fluid is capillary filtrate fluid.

61. (original) The method of claim 60, wherein said sample of capillary filtrate fluid is transported from a subcutaneous location to said sample cell.

62. (original) The method of claim 59, wherein said capillary filtrate fluid is filtered prior to passing said infrared signal through said sample.

63. (original) The method of claim 62, wherein said capillary filtrate fluid is passed through an ultrafiltration membrane at a subcutaneous location of said patient.

64. (original) The method of claim 63, wherein said ultrafiltration membrane passes organics having less than 3000 molecular weight.

65. (original) The method of claim 64, wherein said membrane has a molecular weigh cut off of 30.

66. (original) The method of claim 57, wherein said two glucose absorbance bands are selected so that a first glucose absorbance band has a first absorbance ratio for an interfering substance potentially present in said biological fluid and said second glucose absorbance band has a second absorbance ratio for said interfering substance.

67. (original) The method of claim 66, wherein said transmitted mid infrared radiation further comprises a third glucose absorbance band.

68. (original) The method of claim 66, wherein said interfering substance is lactate.

69. (original) The method of claim 57, wherein said biological fluid is capillary filtrate fluid, said capillary filtrate fluid is transported from a subcutaneous location to said sample cell, said capillary filtrate fluid is passed through an ultrafiltration membrane that allows passage of organics of less than 3000 molecular weight and wherein said detected radiation contains glucose absorbance bands in a region from 1200 cm^{-1} to 950 cm^{-1}.

70-88. (canceled)